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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

November 6, 2008

TO: Internal File

THRU: Steve Christensen, Lead Inspector

FROM: April A. Abate, Environmental Scientist/Hydrologist

SUBJECT: Dugout Canyon, Methane degasification well G-22 and Access Road, Canyon Fuel Company, LLC., Dugout Canyon Mine, C/007/0039, Task ID #3068

SUMMARY:

An amendment titled "Methane Degasification Amendment Well G-22 and Access Road" was submitted to the Division of Oil, Gas and Mining (the Division) on October 1, 2008. This amendment proposes the construction of an additional well, G-22 and an associated access road to the existing MRP. The proposed methane degasification well G-22 and access road will provide one additional methane gas vent hole above the area of longwall panel GIL-8. The Permittee has provided an update to an existing amendment to add this additional well and access road to the permit area.

In addition to an updated narrative discussing the G-22 and access road, hydrologic calculations, maps, cross sections and information relative to culvert and water bar design and sizing, stockpile staging and runoff volumes, and stockpile runoff containment were provided.

On October 23, 2008, the Division conducted a field visit to the site to examine the proposed disturbed area. Areas inspected included: the G-17 well pad area where topsoil from this project is planned to be staged (G-17 well pad is permitted but not currently constructed) and the proposed access road beginning from existing well pad G-16 to the proposed methane degasification well G-22 well pad site. Based on discussions from the October 23, 2008 field visit, the Division and the Operator agreed that the culverts would be oversized (36" diameter) to accommodate large-scale storm events. As discussed in the field, all necessary culvert outlets will be completed with riprap underlain with a filter fabric blanket to line the channel in order to provide energy dissipation and thus minimize the amount of sediment to the receiving drainage.

The hydrologic information provided in the application meets the requirements of the State of Utah R645-Coal Mining Rules. The proposed amendment should be approved at this time.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

GENERAL

Regulatory Reference: 30 CFR 783.12; R645-301-411, -301-521, -301-721.

Analysis:

The application meets the hydrology requirements for general information as provided in R645-301-721. Plate 1-4 is a topographic map depicting the locations of all methane degasification wells including G-22 located approximately 1,000 feet northeast of G-16 in Township 13 South, Range 13 East of the Salt Lake Base Meridian. Figure 1 in Attachment 5-1 of the Methane Degasification Amendment shows the proposed access road and well site G-22 as well as the disturbed area boundary. Plate 7-2 of the MRP depicts the locations of surface-water bodies and existing or pending water rights. In addition, section 724.100 of the MRP provides baseline groundwater information for the permit area including the proposed degas well site.

Findings:

The hydrologic information provided meets the requirements of R645-301-721-Environmental Description.

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.

Analysis:

The application meets the hydrology requirements for Climatological Resource Information as provided in R645-301-724. Page 7-4 of the application provides a reference to Appendix 4-1 of the approved MRP and RA Attachment 7-5 of the Refuse Pile Amendment where climatological data is provided.

Findings:

The hydrologic information provided meets the Climatological Resource Information requirements as provided in R645-301-724.

GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.22; R645-301-623, -301-724.

Analysis:

Geologic information related to methane degasification well G-22 and the proposed access road were included in the amendment application (i.e. Chapter 6 of the original degasification well application).

Findings:

The information provided meets the Geologic Resource Information requirements as provided in R645-301-724.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

Sampling and Analysis

Page 7-3 of the application provides a reference to Section 723 of the approved MRP in regard to Sampling and Analysis. Section 723 of the approved MRP states that water samples will be collected and analyzed according to the methods outlined in "Standard Methods for the Examination of Water and Wastewater" and 40 CFR parts 136 and 434.

Baseline Information

The application provides a reference to Section 724 of the approved MRP. Section 724 of the approved MRP provides baseline information for the permit area (including the proposed site for methane degasification well G-22 and the proposed access road).

Baseline Cumulative Impact Area Information

The application meets the Environmental Description requirements for Baseline Cumulative Impact Area Information (CHIA). The cumulative impact area (CIA) currently in place for the Dugout Canyon Mine covers the proposed methane degasification well G-22 location and the information required for the Division to develop a Cumulative Hydrologic Impact Assessment (CHIA) is presented in the approved MRP. In Section 725 on page 7-4 of the application, Chapters 6 and 7 (of approved MRP) are referenced. Chapters 6 and 7 of the MRP provide the hydrologic and geologic information required by the Division to develop a CHIA.

Modeling

The application meets the Environmental Description requirements for Modeling. No groundwater monitoring was conducted in preparation for any of the previous gob vent hole installations.

Probable Hydrologic Consequences Determination

The application meets the hydrology Environmental Description requirements for Probable Hydrologic Consequences (PHC) as provided in R645-301-728.300. Page 7-5 thru 7-12 of the application discusses the subsections of the probable hydrologic consequences regulations. The probable hydrologic consequences are further discussed in detail in Section 730 of the MRP. Appendix 7-3, Section 3 of the approved MRP contains a Mayo and Associates PHC report that provides hydrologic information for the permit and adjacent area.

Potential impacts to the hydrologic balance

The application meets the hydrology Environmental Description requirements for potential impacts to the hydrologic balance as provided in R645-301-728.310. Page 7-10 of the application states that little to no impacts to the hydrologic balance are anticipated due to 1) the potential impacts are limited to the drilling and construction of the wells; 2) best technology currently available (BTCA) techniques for sediment control will be implemented to minimize the surface disturbance; 3) ground water information provided in the MRP demonstrates that minimal groundwater is located in the area of the proposed degas wells; and 4) any water encountered during the drilling and construction of the well will need to be sealed from the well in order for it to function as an ambient vent of methane gas. The Permittee has indicated that during the advancement and operation of the previous methane degasification wells, minimal amounts of ground water were encountered. Baseline data provided in the MRP supports this assertion.

Acid or Toxic Forming Materials

The application states that no acid or toxic forming materials have been identified in the soils or strata of the Dugout Canyon Mine. The application references Appendix 6-2 of the approved MRP that outlines the finding that the Dugout Canyon Mine area does not contain potentially acid forming or toxic material. The application also references Chapter 6, Section 623 of the Methane Degasification Amendment, which states, "No acid or toxic forming materials will originate at the well sites."

Diversions: General

The application meets the diversions general requirements as outlined in the R645-301-742.300. The application characterizes the drainage that the proposed access road will cross as ephemeral. Based on the field observations that occurred on October 23, 2008, it was the understanding of the Division that all drainage along the access road shall be diverted to the culvert. Attachment 7-1 of the application provides the culvert design calculations as well as design drawings of the culvert installation and outlet detail.

Siltation Structures: General

The application meets the Operational Plan requirements for Siltation Structures: General as provided in R645-301-742.212. The application commits to utilizing berms, silt fences and straw bale dikes to treat runoff. The Permittee has committed to installing siltation structures prior to beginning construction.

Stream Buffer Zones

The application meets the Operational Plan stream buffer zone requirements as provided in R645-301-731.600. R645-301-731.600 prohibits surface disturbance within 100 feet of a perennial or intermittent stream, unless authorized by the Division.

No stream buffer zones have been identified for the proposed disturbed area in the application.

Sediment Yield

The application meets the hydrology Environmental Description requirements for sediment yield impacts as provided in R645-301-728.331.

Page 7-10 of the application provides a discussion as to the hydrologic resources in the area of the proposed G-22 degas well and access road. The amendment states that there are no springs in the path of the road or in the immediate vicinity of the road and drill pad. It is unlikely the construction and operation of the road and drill pad will produce impacts on these nearby water resources. Sediment control techniques and design plans are provided in Chapter 5, Attachment 5-1 and in Chapter 7, page 7-11. Various sediment control techniques to be utilized during construction and operation include appropriate sized water bars and canting the road surface toward the uphill side of the road to divert runoff. Rip rap from native rock will be collected to line the water bars where necessary. Culverts will be placed to direct flow from the ditch to the natural drainages. Silt fencing will be placed at the toe of the fill slopes during construction to reduce the amount of loose material. Outslopes will be seeded during operations to encourage the establishment of vegetation and erosion control. Runoff control measures for the G-22 access road are shown in Attachment 5-1 - Figure 1 of the application.

During construction and operation of the degas well and access road, the application addresses the use of a combination of silt fence, culverts, water bars, and containment berms in order to provide sediment control and reduce the likelihood of disturbed soil from entering the drainage adjacent to the road.

Water Quality

The application meets the requirements of R645-301-728.332. On page 7-12 of the application, the Permittee discusses the potential for water quality impacts as a result of the proposed construction and operation of the methane degasification well G-22 and access road. Soil samples were obtained and analyzed from select sites in the road and pad areas. The sample analysis indicated that no acid-forming or toxic-forming materials were present. Thus any soil moved or exposed as a result of the construction of the road and pad will not result in contamination of the surface or groundwater supplies. Due to the sediment control structures to be installed during the construction and operation of the degas well and access road, the potential for an increase in total suspended solids to the receiving drainages will be minimized. In addition, the Permittee discusses that the dissolved solids within the runoff from the disturbed areas is not likely to noticeably increase above background levels since the disturbance will occur in an area with weathered soils and exposed bedrock at the surface. Upon review of the soil data, it appears that the obtained samples do not contain significant volumes of highly soluble minerals. In addition, no significant volumes of highly soluble materials are proposed to be imported as part of the construction, operation and reclamation of the road and pads.

Ground-water and surface-water availability

The application meets the hydrology Environmental Description requirements for ground water and surface-water availability as provided in R645-301-728.334. Page 7-6 and 7-7 outlines the potential impacts to ground water and surface water availability. As outlined in the

baseline information provided in the MRP, little ground water is located in the area of the proposed degas wells. If ground water is encountered during drilling, the ground water aquifers will be sealed using drilling mud. Upon the completion of the degas well, the casing will be grouted and cement will be placed inside the well casing during reclamation. The grouting of the casing inside the well hole will effectively prevent ground water from entering into the degas wells. In order for the degas wells to function properly, any encountered ground water must be prevented from entering.

The degas wells have little potential to impact or decrease creek flow or spring discharges. The wells are not designed to capture water, dewater aquifers or cause subsidence. In addition, no measurable inflows of water were encountered during the drilling and construction of degas wells G-18A and G-31A. No change in the groundwater availability is anticipated during the installation of G-22. A small amount of surface water shall be used for dust suppression during construction and operations of the road and drill pad.

Potential hydrocarbon contamination

The application states that no hydrocarbon products will be stored at the well sites. However, the Permittee has stated that absorbent materials will be used for the collection of leaked fuels, greases and other oils that may be spilled during the installation of the vent holes. The saturated absorbent materials would then be disposed of at an appropriate landfill facility.

Groundwater Monitoring Plan

Additional groundwater monitoring is not necessary in connection with the construction of methane degasification well G-22 and the access road construction. The baseline data collected for the approved MRP as well as the ongoing groundwater monitoring is sufficient to meet the groundwater monitoring plan requirements for this project. Plate 7-1 of the approved MRP shows the springs and monitoring well locations where baseline information has been obtained and where ongoing groundwater monitoring continues in association with the mining activity. The operational groundwater-monitoring plan has been designed to detect impacts to groundwater resources from mining activity. As such, additional monitoring is not necessary.

Surface-Water Monitoring Plan

Additional surface water monitoring is not necessary in connection with the construction of methane degasification well G-22 and the access road construction. The baseline data collected for the approved MRP as well as the ongoing groundwater monitoring is sufficient to meet the surface-water monitoring plan requirements for this project. Plate 7-1 of the approved MRP shows the stream locations where baseline information has been obtained and where ongoing groundwater monitoring continues in association with the mining activity. The

operational surface water-monitoring plan has been designed to detect impacts to surface water resources from mining activity. As such, additional monitoring is not necessary.

Findings:

The hydrologic information provided meets the requirements of R645-301-728 - Probable Hydrologic Consequences regulations.

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Monitoring and Sampling Location Maps

The application meets the requirements for Monitoring and Sampling Location Maps. Plate 7-1 in the MRP, Hydrologic Monitoring Stations, depicts the surface water and groundwater monitoring stations in the general vicinity of the G-22 methane degasification well and access road. These surface water and groundwater sampling locations have been established to monitor the impacts to surface water mining operations. The application has demonstrated that additional monitoring for surface and groundwater in the area of the G-22 methane degasification well and access road is not necessary.

Subsurface Water Resource Maps

Plate 7-1 (Hydrologic Monitoring Stations) of the approved MRP depicts the subsurface water resources in the vicinity of the proposed G-22 methane degasification well and access road.

Surface Water Resource Maps

Plate 7-1 (Hydrologic Monitoring Stations) of the approved MRP depicts the surface water resources in the vicinity of the proposed G-22 methane degasification well and access road.

Well Maps

Plate 7-1 (Hydrologic Monitoring Stations) of the approved MRP depicts the locations of the monitoring wells within the permit area. Monitoring well GW-19-1 is located approximately ½ to ¾ of a mile west of the proposed methane degasification well G-22 site.

Findings:

The hydrologic information provided meets the Maps, Plans and Cross Sections of Resource Information requirements as provided in R645-301-722 and R645-301-731.

OPERATION PLAN

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 784.24, 817.150, 817.151; R645-301-521, -301-527, -301-534, -301-731.760, -301-732,

Analysis:

Plans and Drawings

Attachment 5-4 in Chapter 5 depicts a typical road cross section. The cross section clearly shows that the road will be sloped (1-2%) towards the hillside. An incised ditch at the toe of the hillside will convey road runoff down gradient to one of three road runoff culverts.

The Permittee provides cross sectional information for the proposed G-22 drill pad and access road in Attachment 5-1. Figure 2 of Attachment 5-1 Typical Cross-Sections for G-22 Pad depicts the pre, operational and post mining topography contours for the construction of drill pad G-22. Figures 2A thru 2E depicts the proposed road profile and road cross sections for the G-22 access road. Figure 1 of Attachment 5-4 Typical Road Cross Section depicts the road width as approximately 16' with 1 to 1 and 1 to 0.5 slopes depicted on the cut bank of the proposed access road.

Hydrology calculations for the soil stockpile are included in Attachment 7-1. The calculations summarize topsoil excavation volume, stockpile dimensions, excess subsoil volume, stockpile runoff volume, and stockpile runoff containment volume calculations.

Attachment 5-1 - Figure 3 - Approximate Drilling Location for G-22 provides the location of the proposed access road and G-22 from the G-16 pad location. The disturbed area

is outlined along with a proposed berm constructed on the south side of the access road and around drill pad G-22. The direction of sheet flow running off the drill pad is shown to flow toward the east at a 1-2% grade. Culvert locations, water bars and silt fence were also depicted on the figure. However, based on an October 23, 2008 field visit to the site, some of these drainage and sediment control structures were to be modified based on the construction activities and any necessary modifications made in the field. A cross section is provided that depicts the filter fabric and riprap construction detail for the receiving channel of the culverts.

Performance Standards

The application meets the requirements for Performance Standards of Road Systems and Other Transportation Facilities as provided under R645-301-741 and -742.400.

Attachment 7-1 provides the hydrologic calculations utilized in designing the proposed road drainage system and sediment control systems for the well pad, soil stockpile and access road. The Permittee utilized HydroCad 8.00 software for calculating peak flows and stages in each culvert and ditch to be utilized in the project's drainage system. HydroCad 8.0 employs the Soil Conservation Service (SCS) Method for determining the peak storm runoff volumes to be used in sizing the various components of the projects drainage system. Attachment 7-1 provides the data utilized for the SCS calculations. In addition, the Permittee provides a map that depicts the watershed hydrology utilized in the drainage system calculations. From these watershed delineation map, the Permittee obtained slope and acreage data.

The proposed drainage system will utilize up to three culverts for the diversion of ephemeral drainages that intersect the proposed access road. The hydrology calculations utilized for the sizing of the road runoff culverts were based on a 10 year, 24 hour precipitation event. Based on discussions from the October 23, 2008 field visit, the Division and the Operator agreed that the culverts would be oversized (36" diameter) to accommodate large-scale storm events. In each instance, the performance standards were either met or exceeded per R645-301-742.333 (Diversion of Miscellaneous Flows) and R645-301-742.423.1 (Road Drainage). Both of the aforementioned regulations call for the use of a 10 year 6 hour event in determining proper sizing and design of various drainage system components. The culvert sizing data and criteria are outlined in Attachment 7-1.

As stated previously, the road drainage system will employ up to 3 culverts to dissipate and control runoff generated on the road. Figure 1 of Attachment 5-1 depicts the location of a single culvert along the proposed access road. However, based on discussions in the field, additional culverts may be required as needed during the construction of the access road. Figure 1 of Attachment 5-4 indicates that the road will be sloped approximately 1-2% towards the hillside away from the outslope. Runoff generated from the road surface will be unable to run over the containment berms located on the edge of the road and thus minimize the amount of

sedimentation to the adjacent drainage. The road runoff will be conveyed to an incised ditch on the hillside portion of the road prior to being discharged from one of the road culverts. Riprap channels will be constructed at the outlet of each of the culverts. The peak design culvert velocity (calculated with the required 10 year 6 hour design storm event) is greater than 5 feet per second (fps) for the upper watershed area therefore, a riprap detail at the outlet was calculated in order to decrease the flow velocity of the channel and reduce erosion. As discussed in the field, all culvert outlets will be completed with a filter blanket and riprap channel to provide energy dissipation and thus minimize the amount of sediment to the receiving drainage.

Page 5-10 of the application discusses the maintenance plan to be implemented during the construction and operation of the degas wells and access road. An existing AMV road leads to well pad G-16 where the proposed access road to G-22 will begin. The Permittee states, "When necessary during the normal use of the AMV road, it will be graded, berms will be repaired, culverts inlets/outlets and ditches will be cleaned." In addition, the AMV access road will be "repaired as soon as practical following a catastrophic event". The application states that the access road to well pad G-22 will not be utilized in the winter due to the snow pack and lack of access to the roadway below the site.

The Permittee provides the soil stockpile containment calculations in Attachment 7-1. A 10 year 24 hour design storm event was used in calculating the storm volumes and berm storage capacities. The berms have been designed to fully contain the 10 year 24 hour design storm event.

Findings:

The hydrologic information provided meets the requirements of the R645-State of Utah Coal Mining Rules.

SPOIL AND WASTE MATERIALS

Regulatory Reference: 30 CFR Sec. 701.5, 784.19, 784.25, 817.71, 817.72, 817.73, 817.74, 817.81, 817.83, 817.84, 817.87, 817.89; R645-100-200, -301-210, -301-211, -301-212, -301-412, -301-512, -301-513, -301-514, -301-521, -301-526, -301-528, -301-535, -301-536, -301-542, -301-553, -301-745, -301-746, -301-747.

Analysis:

Disposal Of Noncoal Mine Wastes

The application states that no hydrocarbon products will be stored at the well sites. However, the Permittee has stated that absorbent materials will be used for the collection of

leaked fuels, greases and other oils that may be spilled during the installation of the vent holes. The saturated absorbent materials will then be disposed of at an appropriate landfill facility.

Findings:

The hydrologic information provided meets the Spoil and Waste Materials Operation requirements as provided in R645-301-747.

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, **-301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764,** -301-830.

Analysis:

The reclamation plan regarding the G-22 drill pad and access road is presented on page 5-17 of the application. Once the degasification process at well G-22 is complete, the well pad and access road from G-16 will be reclaimed. No temporary surface structures or sedimentation ponds are to be located on the well sites. Reclamation will begin at the segment of the road closest to drill pad G-22 and continue toward G-16. The cut and fill slopes will be reshaped to their original contours at the well site and along the access road, pocked, gouged and seeded. Upon the termination of degasification efforts, the methane desgasification well G-22 will be sealed in accordance with Federal Regulations 43 CFR CH. 11, Subpart 3484, (3) per a decision by the BLM and the Division.

Findings:

The reclamation information provided meets the General Requirements for Reclamation Plan.

APPROXIMATE ORIGINAL CONTOUR RESTORATION

Regulatory Reference: 30 CFR Sec. 784.15, 785.16, 817.102, 817.107, 817.133; R645-301-234, -301-412, -301-413, -301-512, -301-531, -301-533, -301-553, -301-536, -301-542, -301-731, -301-732, -301-733, -301-764.

Analysis:

The proposed access road and drill pad will be returned to their approximate original pre-mining contours during reclamation as detailed in Attachment 5-1 – Figures 2 and 2A thru 2E.

Following reclamation of the road slopes, settling/rills are not anticipated, but should they develop, the areas will be regraded and revegitated.

At the time of reclamation, a determination will be made between the Permittee and the Division as to the "best current technology" for the placement or use of silt fence/strawbales for sediment control along the path of the reclaimed road.

Page 5-14 of the application provides a discussion of the reclamation work to be performed at the drill pads. A timetable for the completion of each major step in the reclamation plan is presented in Figure 5-26. Additional reclamation information is also provided in Attachment 5-2.

Findings:

The hydrologic information provided meets the Approximate Original Contour requirements as provided in R645-301-764.

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 701.5, 784.24, 817.150, 817.151; R645-100-200, -301-513, -301-521, -301-527, -301-534, -301-537, -301-732, -301-760.

Analysis:

Reclamation

The roads that existed prior to the drilling program will be retained after reclamation. The access road to G-22 will be reclaimed after methane extraction has been completed.

The access road utilized for methane degasification well G-22 will be returned to its approximate original contour during reclamation as detailed in Attachment 5-2. Following reclamation of the road slopes, settling/rills are not anticipated, but should they develop, the areas will be regraded and revegitated.

At the time of reclamation, a determination will be made between the Permittee and the Division as to the "best current technology" for the placement or use of silt fence/strawbales for sediment control along the path of the reclaimed road.

Findings:

The hydrologic information meets the Reclamation Plan requirements for Road Systems and Other Transportation Facilities.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

Analysis:

No additional impacts are expected from the construction of methane desgasification well G-22 and the proposed access road.

Findings:

The hydrologic information provided meets the Cumulative Hydrologic Impact Assessment requirements as provided in R645-301-730.

RECOMMENDATIONS:

The hydrologic information provided in the application meets the requirements of the State of Utah R645-Coal Mining Rules. The proposed amendment should be approved at this time.

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